

unknown to most students of building materials, it might be advisable to substitute the more familiar "mirror."

However, in spite of a few minor points like these, the book as a whole is well written, and admirably adapted to the class for whom it is intended. It deserves to take a permanent place among the textbooks upon the subject, and in future editions the points referred to will no doubt receive attention.

H. B.

ECONOMIC BACTERIOLOGY.

Bacteria in Relation to Country Life. By Dr. Jacob G. Lipmann. Pp. xx+486. (New York: The Macmillan Co.; London: Macmillan and Co., Ltd., 1908.) Price 6s. 6d. net.

WRITTEN in non-technical language, this book gives a good account of the activities of micro-organisms. It may therefore be recommended to all those who desire to obtain a general knowledge of the functions of bacteria and the important rôle they play in relation to daily life, while the intelligent agriculturist will find a large amount of information which should aid him in his work. After a brief survey of the form, structure, food requirements, and conditions of growth of bacteria, successive chapters deal with these organisms as met with in air, water, and sewage. The relation of water to health and disease is discussed, and the chief factors in connection with the contamination and purification of water are detailed. A readable account is given of the disposal of sewage and of bacterial systems of sewage disposal. Next follow the most important sections of the book, viz. the relation of bacteria to soil fertility and the influence of manures. We here find accounts of the sources of nitrogen in the soil, of nitrification and denitrification, of the action of leguminous crops in fixing nitrogen, and of soil inoculation with pure cultures of nitrogen-fixing organisms. The proper methods of storing farmyard manure are dealt with at some length, and it is shown that under different conditions of storage the losses of organic matter from the manure stack in three or four months may range from 15 to 20 per cent. to 40 to 50 per cent. of the initial quantity, and valuable suggestions are made on the best means of conservation of manurial constituents, both by proper methods of storage and by the use of chemical fixatives.

The chapters which follow on milk, its production and preservation, are also excellent. Details are given which show that careful hand-milking yields a better milk as regards bacterial contamination than any milking machine, unless extreme precautions are taken in the sterilisation of the latter. The subject of pasteurisation of milk is also critically discussed, and the following extract sums up the author's views on the advantages and disadvantages of the process, views with which we fully agree and which should be widely known:—

"Pasteurisation is effective for the destruction of disease bacteria in milk and for the improvement of its keeping quality. It is agreed that city children fed on pasteurised milk, properly heated and properly

cooled, are less subject to intestinal disturbances than children fed on raw milk. At the same time, it must be admitted that the pasteurisation of milk already filled with bacteria, and the products of their activities, will not remedy its defects. The undesirable substances formed by the bacteria are not entirely destroyed by the heating, and may still cause injury to the person consuming the milk.

"By resorting to pasteurisation, a dealer may be able to dispose of milk that would otherwise quickly become unsaleable. Similarly, the failure to cool the pasteurised milk quickly and to keep it at a temperature of 50°, or below that, may lead to the rapid multiplication in the milk of germs producing injurious or poisonous substances. Hence, pasteurised milk should be consumed within twelve hours, or should be immediately cooled down to between 45° and 50°."

The subject of tuberculosis in relation to milk is fully discussed. It is pointed out that large numbers of tubercle bacilli may pass into the excreta of tuberculous cows, a fact which was fully confirmed by the experiments of our Royal Commission on Tuberculosis as contained in the last report, and it is concluded that

"Whatever difference of opinion there may prevail as to the extent of human tuberculosis caused by the consumption of milk and milk products, it is conceded by sanitarians that persistent efforts should be made to eradicate bovine tuberculosis."

Subsequent chapters deal with milk beverages, butter and cheese, canning, ensilage and fermented liquors.

The book is adequately illustrated and clearly printed.

R. T. HEWLETT.

FORESTRY.

(1) *Our Forests and Woodlands.* By Dr. J. Nisbet. New and revised edition. Pp. xxiii+348. (London: J. M. Dent and Co., 1909.) Price 3s. 6d. net.

(2) *Trees: A Handbook of Forest-Botany for the Woodlands and the Laboratory.* By the late H. Marshall Ward. Vol. v., Form and Habit. Pp. xi+308. (Cambridge: University Press, 1909.) Price 4s. 6d. net.

(1) THE first edition of Dr. Nisbet's well-known book, "Our Forests and Woodlands," appeared in 1902. The second edition has now been issued, and will doubtless be welcomed by a large circle of readers, not only on account of the interesting and important information it contains, but the price is such as to bring it within the reach of many who cannot afford the more expensive, though excellent, works on forestry at present available to the English reader. A very important, and probably the most outstanding feature of the new edition is the preface, in which the author has given a *résumé* of the progress which has been made in forestry since the appearance of the first edition. The doings of the various Governmental committees and commissions which have sat of late years are clearly set forth. There is also given a very striking table in the form of an abstract from the "Annual Statement of the Timber Trade of the United Kingdom" for 1906 and 1907. Here it is shown that the gross total imports of wood and timber, wood-pulp, and manufactured wood-pulp come to about 37,500,000l. To supply these

present demands, leaving out of consideration the increasing consumption, which will no doubt continue, the author points out that it would require 3,000,000 acres of conifer and other woodlands, or an annual cut of 50,000 acres of timber worked on a sixty years' rotation. Contrary to opinions held in other quarters, Dr. Nisbet anticipates the decrease in the supply, to this country at least, of pitwood. At present large supplies come from Bordeaux, but signs are not lacking that the quantity of suitable timber is decreasing, while the French collieries themselves show increasing demands. It would be a serious blow to all our industries dependent on coal should the supply of pitwood fail, and in any case the price is likely to increase, which will, other things remaining the same, raise the price of coal.

Another very important question to which the author directs attention is the wood-pulp industry. At the present time the United States dominate the paper market of the world, but there is an increasing shortage of suitable timber for the making of paper-pulp, which is, therefore, naturally increasing in price, and the recent large rise in the price of paper is due to the growing shortage in the supply of spruce. Since 1904, the cost of mechanical wood-pulp in this country has increased from 85s. a ton to 120s., while in America during the past ten years the price has increased threefold. The demand for pitwood and wood-pulp is bound to continue; in other words, there is a sure market for such produce, and the author, who is a widely recognised authority on such matters, points out that our waste lands and poor pastures are to a very large extent capable of producing conifers and soft-wood crops which could be established at comparatively little cost, and would yield good returns to the owner, and at the same time supply pit-wood for our mining industries and therefore indirectly benefit all industries dependent upon coal; and, lastly, with a sufficient supply of raw material for the making of paper-pulp a new industry would be created in this country.

There are altogether eleven chapters in the book, with an index at the end. Some very fine illustrations are also included. The first two chapters are mainly taken up with historical matters, which provide extremely interesting reading. The next two chapters deal with the silvicultural characteristics of the oak and beech. In chapter v. the remaining hardwoods are considered, while the soft woods, such as alder, birch, lime, and poplars, are dealt with in chapter vi. Coniferous plantations of pines, firs, and larch are treated in chapter vii. Chapter viii. is more arboricultural, as it deals with hedges and hedgerow trees. Chapter ix. is occupied with the consideration of high-woods, copses, and coppicewoods, while the last two chapters, viz. x. and xi., are devoted to woodlands, game and sport, and the improvement of British forestry respectively.

The book is full of sound and trustworthy information. Its price is moderate, and it deserves a hearty reception from all those interested, directly or indirectly, in our forests and woodlands.

(2) This volume dealing with the form of trees is the final one of its series. The volume, like the

previous one, has been seen through the press by Dr. Groom, who informs us in the preface that he has reduced changes from the original to a minimum. The few alterations and additions which were found necessary have been indicated by enclosure within square brackets. Part i. deals in a general way with the habit or form of trees, and, in addition to the text, the form or habit of the tree is indicated in many instances by illustrations, while the form of the branch-system is also indicated diagrammatically. A series of Mr. Henry Irving's well-known photographs illustrating the outward appearance of the bark has been included.

In part ii. the trees are detailed according to their form and other external appearances. The system of tabulation adopted is similar to that employed in the previous volumes. At the end we have an appendix which contains a classification of trees and shrubs according to their seedlings, and here we have many excellent drawings by Miss E. Dale from actual seedlings, the scale of magnification or reduction being indicated in each case. No doubt this appendix, as Dr. Groom points out, is not so complete as the author evidently intended to make it, yet it is, including the drawings, valuable so far as it goes, and is well worthy of careful study.

Taking the whole work as it now stands, we have five volumes which deal respectively with buds, leaves, flowers, fruits, and form, and it will be admitted on all hands that the late Prof. Marshall Ward has left behind a monumental work which will long be considered a standard on trees.

NEW BOOKS ON ORGANIC CHEMISTRY.

- (1) *Modern Organic Chemistry*. By Dr. C. A. Keane. Pp. xiv+503. (London: The Walter Scott Publishing Co., Ltd., 1909.) Price 6s.
- (2) *Practical Organic Chemistry*. By Dr. J. J. Sudborough and T. C. James. Pp. xviii+378. (London: Blackie and Son, Ltd., 1909.) Price 5s. net.
- (3) *The Elements of Organic Chemistry*. By E. I. Lewis. Pp. viii+224. (Cambridge: University Tutorial Press, Ltd., 1909.) Price 2s. 6d.
- (4) *Abhandlung über die Glycole oder Zwei atomige Alkohole*. By Adolf Wurtz. Pp. 96. Ostwald's *Klassiker*, No. 170. (Leipzig: W. Engelmann 1909.)

(1) **T**O anyone possessing a sound elementary knowledge of organic chemistry we can strongly recommend Dr. Keane's book. It is not a text-book, for there is no systematic arrangement of the materials, and the properties of individual substances and the relations of different groups are not brought into relief. If, for example the student wishes to learn something about ordinary phenol, he will find bits of scattered information in four different places. Systematic instruction is obviously not the object of the book. But although the treatment is unconventional, and frequent digressions are made into regions not usually embraced by organic text-books, this very fact rather enhances than detracts from the interest of the